

REMARKS

The Office Action mailed April 28, 2009 has been carefully considered. Reconsideration in view of the following remarks is respectfully requested.

Claim Status and Amendment of the Claims

Claims 1-3 and 5-6 are currently pending.

No claims stand allowed.

Claims 1, 2, and 6 have been amended to more particularly point out and distinctly claim subject matter regarded as the invention. Support for these claims is found in the specification, claims, and figures as originally filed.

Claim 4 has been cancelled without prejudice or disclaimer of the subject matter contained therein.

Objections to the Claims

Claims 1-6 stand objected to for various informalities.¹ With this Amendment, Claim 4 has been cancelled without prejudice or disclaimer of the subject matter contained therein, and Claims 1, 2, and 6 have been amended accordingly. Withdrawal of the Objection to the Claims is respectfully requested.

¹ Office Action mailed April 28, 2009, at pp. 2-3.

The 35 U.S.C. § 103 Rejection

Claims 1, 3, and 5-6 stand rejected under 35 U.S.C. § 103 as allegedly being unpatentable over Boyd² in view of Bushberg et al.³ and Penney et al.^{4 5} This rejection is respectfully traversed.

According to the M.P.E.P.,

To establish a *prima facie* case of obviousness, three basic criteria must be met. First there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in the applicant's disclosure.⁶

Furthermore, the mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination.⁷

Claim 1 as presently amended recites:

² U.S. Patent No. 4,138,721 to Boyd.

³ Bushberg et al., "The Essential Physics of Medical Imaging," 2002, ISBN 0-683-30118-7.

⁴ Penney et al., "A Comparison of Similarity Measures for use in 2D-3D Medical Image Registration," 1998, IEEE, Volume 17, Number 4, Pages 586-595.

⁵ Office Action at ¶ 3.

⁶ M.P.E.P. § 2143.

⁷ *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990).

A method for reconstructing a radiographic image of a large sized object by bits, the bits being crossed by a diverging radiation produced by a source, the radiation undergoing an attenuation, the attenuation being measured by a mono-dimensional or two-dimensional network of detectors on which the radiation projects, each measurement giving a projection vignette, the source as well as the network of detectors being displaced along the object at each measurement so that projection vignettes overlap, the method comprising a combination of the overlapping vignettes for reconstructing the image, as well as the following steps :
discretising the object into voxels defining reconstruction heights;
associating the voxels with at least one detector respective of the network on which the radiation projects after having crossed the voxel;
allocating an attenuation value to each voxel according to the values measured by the associated detector; and
combining the attenuation values of the voxels along parallel columns at the different reconstruction heights to obtain a two dimensional image.

Boyd discloses a process in which the measurements are made with a fan-shaped beam and an opposite array of detectors, all occupying a plurality of aligned positions so that the overall image of the object is made of overlapping vignettes (FIG. 2). But Boyd differs from embodiments of the invention as presently claimed, as to how the image is actually reconstructed from these measurements, because Boyd computes absorption or emission coefficients μ_k , for each voxel in a slice of a human body (See FIGS. 1 and 2, or alternatively FIGS. 3 and 4) so that the two-dimensional image that is displayed by device 51 is an aggregation of these coefficients (See also FIG. 12, and col. 4, l. 5-18 and col. 7, l. 43-44). When Boyd endeavors to do a more complete study of a body, it merely contemplates a plurality of such slices (FIG. 16). Boyd therefore neither discloses nor suggests reconstructing a two-dimensional image with three-dimensional data of the object, *in combining the attenuation values of the voxels along parallel columns at the different reconstruction heights*. Furthermore, Boyd's images are slices that are partial views of the object, when the final image in embodiments of the invention as presently

claimed is a complete view thereof: they are of different types. With this Amendment, Claim 1 has been amended to make this distinction more clear. Specifically, Claim 1 has been amended to recite in part:

combining the attenuation values of the voxels *along parallel columns at the different reconstruction heights* to obtain a two dimensional image.
(emphasis added)

Additionally, Neither Bushberg et al. nor Penney et al. mention or suggest this characteristic. Bushberg et al. merely mentions voxels. Penney et al. discloses that images can be produced by casting rays through a CT volume, the projections of which resemble a radiograph. However, this process amounts to a mere measurement in which the image is taken directly, and Penney et al. does not suggest a process in which data are computed at the voxels of the object and then combined along columns, which are inherently different from the directions of the rays used for the measurements when fan-shaped beams are used.

In using a fan-shaped beam without the inventive combination of embodiments of the invention as presently claimed, Penney et al. does not correct the effects of different magnifications of the details according to their heights in the measured object, whereas the embodiments of the invention as presently claimed improve the radiographs in solving this drawback.

For at least the above reasons, the Applicant respectfully submits Claim 1 is allowable over the cited art of record and the 35 U.S.C. § 103 Rejection of Claim 1 must be withdrawn.

Dependent Claims 3, 5, and 6

Claims 3, 5, and 6 depend from Claim 1. Claim 1 being allowable, Claims 3, 5, and 6 must also be allowable for at least the same reasons as for Claim 1.

The Second 35 U.S.C. § 103 Rejection

Claims 2 and 4 stand rejected under 35 U.S.C. § 103 as allegedly being unpatentable over Boyd in view of Bushberg et al., and Penney et al., and further in view of Ribeiro et al.^{8 9} This rejection is respectfully traversed.

With this Amendment, Claim 4 has been cancelled without prejudice or disclaimer of the subject matter contained therein, rendering the rejection moot as to Claim 4. Claim 4 depends from Claim 1. The arguments made above with respect to the 35 U.S.C. § 103 rejection of independent Claim 1 apply here as well. The 35 U.S.C. § 103 rejection of Claim is unsupported by the cited art of record because the limitations of Claim 1 are not taught or suggested by Boyd in view of Bushberg et al. and Penney et al. Accordingly, the 35 U.S.C. § 103 rejection of dependent claim 4 based on Boyd in view of Bushberg et al. and Penney et al., and further in view of Ribeiro et al., is also unsupported by the cited art of record because Boyd in view of Bushberg et al. and Penney et al., and further in view of Ribeiro et al., does not teach or suggest all claim limitations, and the rejection must be withdrawn.

⁸ Ribeiro et al., "Tridimensional Image Reconstruction Method Based on the Modified Algebraic Reconstruction Technique and B-spline Interpolation," 1997, IEEE, Proceedings on Computer Graphics and Image Processing 1997, Pages 111-118).

⁹ Office Action at ¶ 4.

In view of the foregoing, it is respectfully asserted that the claims are now in condition for allowance.

Conclusion

It is believed that this Amendment places the above-identified patent application into condition for allowance. Early favorable consideration of this Amendment is earnestly solicited.

If, in the opinion of the Examiner, an interview would expedite the prosecution of this application, the Examiner is invited to call the undersigned attorney at the number indicated below.

The Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

Please charge any additional required fee or credit any overpayment not otherwise paid or credited to our deposit account No. 50-3557.

Respectfully submitted,
NIXON PEABODY LLP

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